PLATE 13
Overview of Completed Excavations and North Wall Profile--Area C

I - Dark brown-black sandy loam (humus) II - Medium yellow-brown sandy silt III - Yellow-brown sandy silt

TABLE 17

Summary Catalog of Lithic Artifacts - Area C

	Quartz	Jasper	Chert	Quartzite	Chalcedony	Rhyolite	Argillite	Ironstone	Total
Flakes	399(32)	301(30)	240(47)	85(19)	24(1)	9(1)	0	0	1,058(130)
Cores	0	0	0	1(1)	0	0	0	1(1)	2(2)
Utilized flakes	1(1)	0	0	0	0	0	0	0	1(1)
Early stage bifaces	5	1(1)	0	0	1	0	0	0	7(1)
Late stage bifaces	0	7(1)	2	1	3	0	0	0	13(1)
Drill	0	0	0	0	0	0	1	0	1
Projectile points	4(1)	4(1)	1	0	1(1)	1	0	0	11(3)
Total	**410(34)**	**314(33)**	**246(47)**	**87(20)**	**29(2)**	**10(1)**	**1**	**1(1)**	**1,096(138)**

KEY: ( ) = cortex

EXCAVATION RESULTS AND INTERPRETATIONS - AREA C

Area C is located approximately 45 m north and 100 m west of Area B and was systematically excavated in 1 m sq. test units as well as block excavations in the core area (Figures 7 and 12; Plates 1 and 13). Final Phase II excavations in Area C were conducted using the grid established for the site during Phase I. Table 17 shows a summary catalog of the lithic artifacts from Area C. In addition 34 ceramic sherds and 212 fire-cracked rocks were recovered.

Stratigraphy and Site Context

Figure 38 and Plate 13 show the natural stratigraphic profile of the north wall of Area C. The top of the profile consists of a dark brown/black recent humus soil (Horizon I) which extends to a depth of approximately 5-10 cm. Horizons II and III are sandy silts which are yellow/brown in color. They are located immediately beneath Horizon I. Horizon II varies between 5 cm and 35 cm in depth, and Horizon III varies between 10 cm and 45 cm in depth. Gravels are present in these horizons. Horizons IV and V are iron-rich sands and clays that are coarser in texture than any of the overlying horizons. Pebbles and gravels are common throughout these horizons. Horizon IV was encountered approximately 30-40 cm below modern ground surface and directly underlies Horizon III in the core area and in test units east of the core area (Figure 38); Horizon V was encountered at a depth of approximately 25-45 cm below modern ground surface and directly underlies Horizon III in test units west of the core area. The bottom limits of these horizons are unknown. In sum, the basic stratigraphic profile of Area C consists of four parts: 1) a modern humus soil (Horizon I), 2) yellow-brown sandy silts (Horizons II and III), 3) orange-brown sand with gravels in the core area and east (Horizon IV), and 4) orange-brown sand with gray sandy clay mottling west of the core area (Horizon V).

FIGURE 38
North Wall Profile--Area C

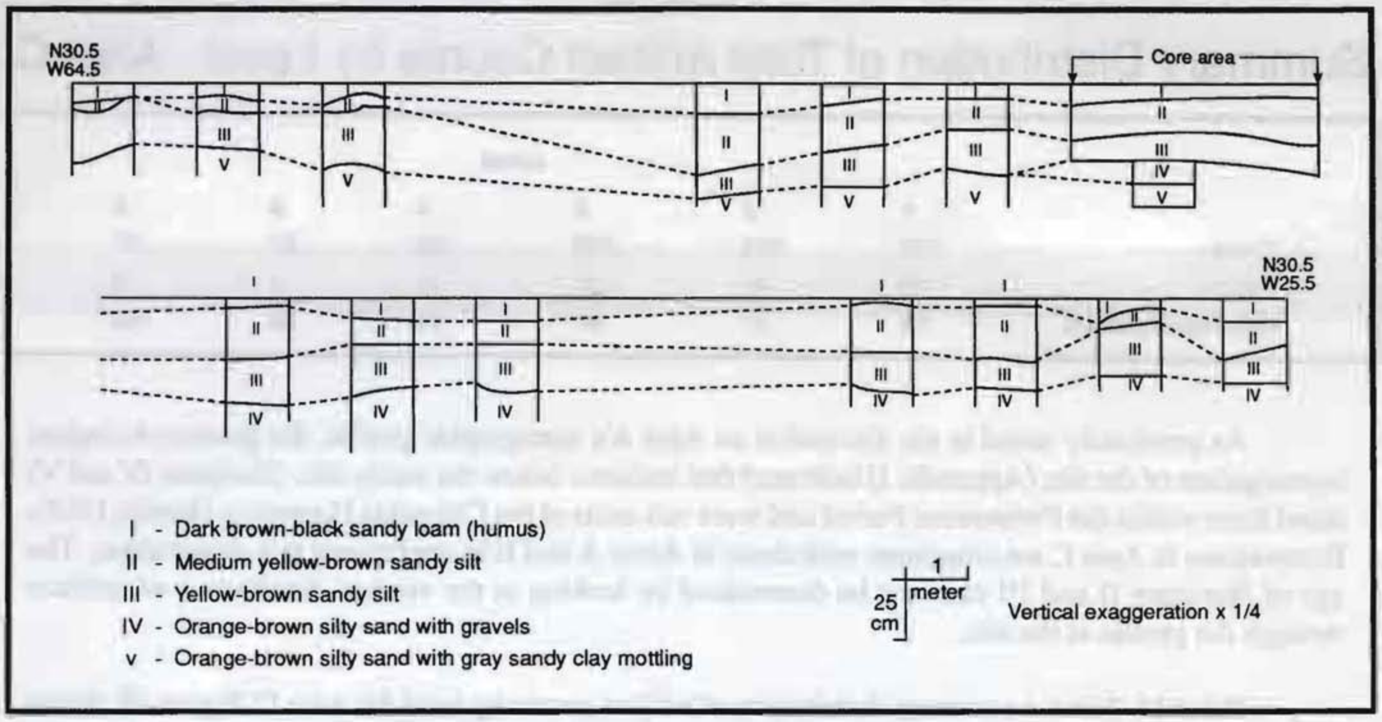


PLATE 14
Evidence of Tree Root Disturbance--Area C

TABLE 18

Summary Distribution of Total Artifact Counts by Level - Area C

	Level					
	1	2	3	4	5	6
Count	216	539	323	126	87	27
Percent	16	41	24	10	7	2
Cumulative percent	16	57	81	91	98	100

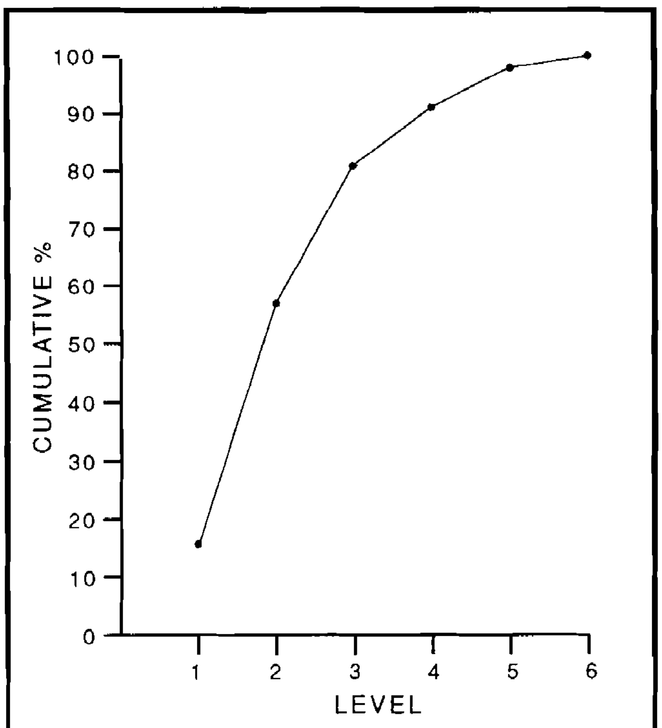
As previously noted in the discussion on Area A's stratigraphic profile, the geomorphological investigation of the site (Appendix I) indicated that horizons below the sandy silts (Horizons IV and V) dated from within the Pleistocene Period and were sub-units of the Columbia Formation (Jordan 1964). Excavations in Area C are consistent with those in Areas A and B in confirming this observation. The age of Horizons II and III can best be determined by looking at the vertical distribution of artifacts through the profile at the site.

Table 18 shows a summary distribution of artifact counts by level for Area C; Figure 39 shows the cumulative percentage distribution with depth. These data show that the vast majority of artifacts (81%) are found within 20 cm of the modern ground surface. As in Areas A and B, Area C was heavily disturbed by tree roots (Plate 14), which would explain the translocation of artifacts downward through the profile. It is likely that Horizons II and III, with their occasional presence of pebbles and gravels, represent a silty low energy facies of the Columbia Formation.

Because the artifacts are relatively shallow and buried in a compressed and thin stratigraphic context, and because the natural displacement of artifacts in Area C seems to extend over at least 30 cm, it is impossible to distinguish separate components, and all of the artifacts must, therefore, be viewed as a series of disturbed multicomponent occupations for analysis.

FIGURE 39

Cumulative Percent of Total Artifacts with Depth-- Area C

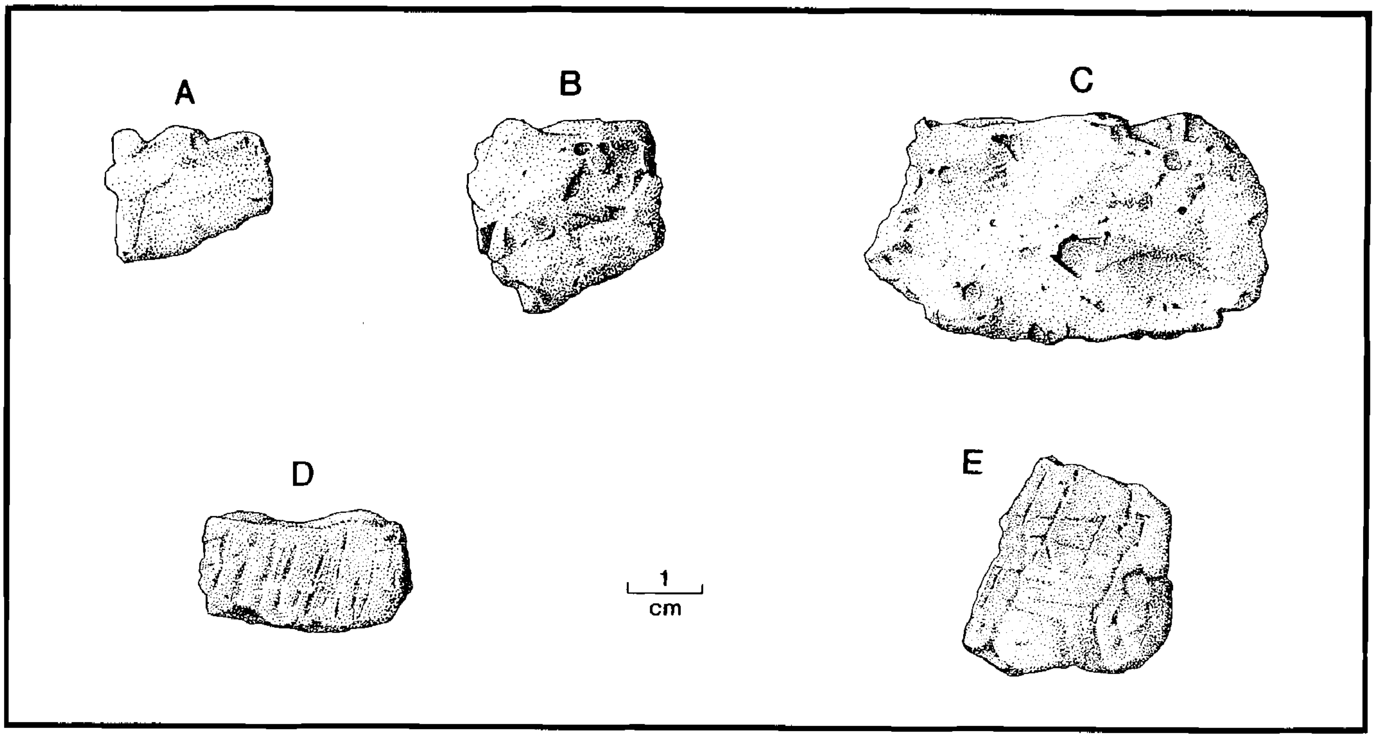


Site Chronology

No radiocarbon samples were recovered from Area C; therefore, diagnostic projectile points and ceramic sherds are the main sources of data for determining the chronology of the area's occupation. Figure 40 shows a sample of the ceramic sherds found in Area C. In general, the ceramic assemblage from Area C does not represent

FIGURE 40

Sample of Ceramic Sherds--Area C



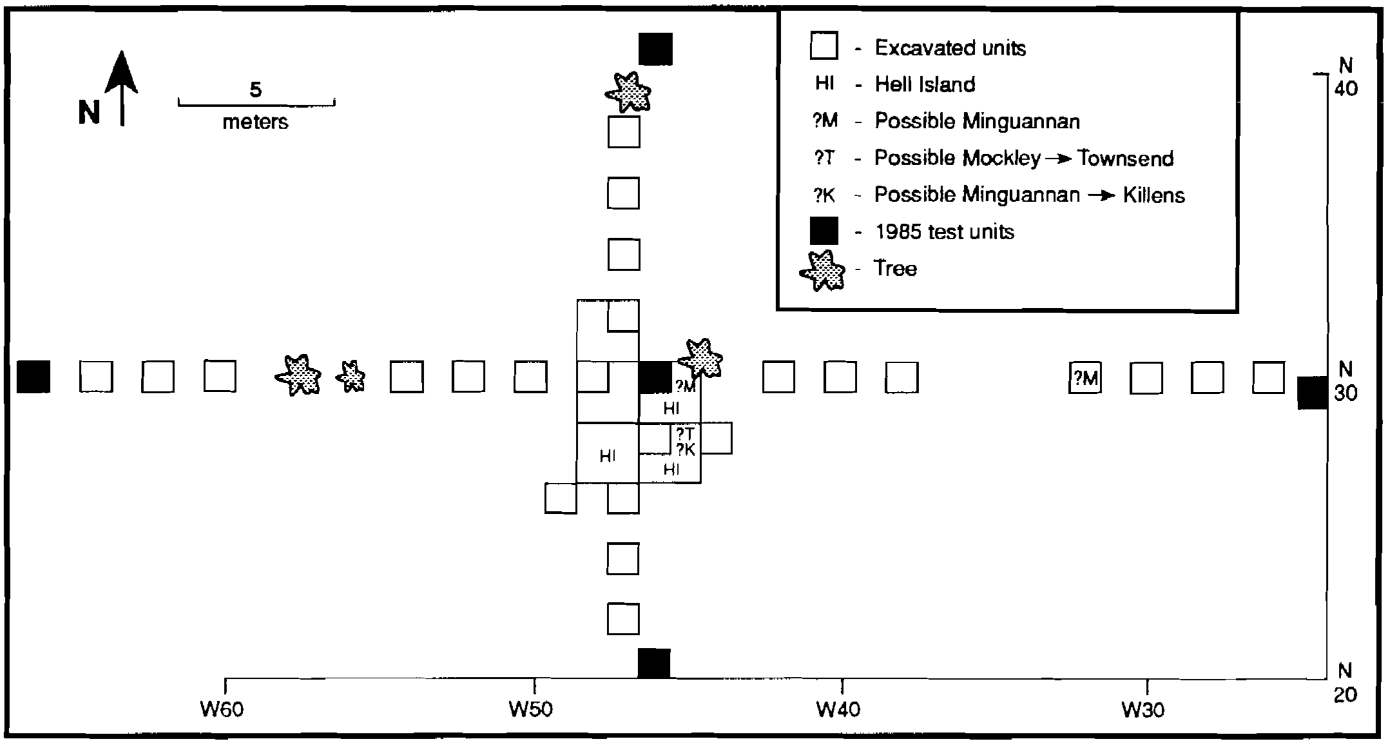
classic examples of diagnostic ceramic types. The sherds are mostly quite small, many are spalled, and surfaces are often worn. In addition, temper is often inconsistent even within a particular diagnostic classification.

Seventy-six percent of the identifiable sherds are Hell Island type. However, in addition to the typical tempering agents of quartz and mica, a few sherds also contain occasional grit, shell, and/or clay particles. The date range for Hell Island ceramic wares is A.D. 600 - A.D. 1000 (Custer 1989:176; Artusy 1976:4) and this date range applies to at least a portion of Area C. Hell Island ceramics within Area C are found in a very limited area of the site (Figure 41).

Two small sherds, including one rim piece (Figure 40A), resemble Minguannan ceramic wares. The rim sherd is relatively thin (0.44-0.5 cm) and scalloped. Both sherds are quite small and are tempered with finely crushed quartz. It is possible that these sherds are Hell Island, but the thinness of the rim suggests the possibility of the Minguannan classification. One sherd identified as Minguannan was recovered in the Phase I excavations at Paradise Lane (Coleman, Hoseth, and Custer 1987). Minguannan ceramic wares have been found in association with triangular projectile points at several macro-band base camps in northern Delaware (7NC-E-6 and 7NC-E-18) which date to the Woodland II Period (ca. A.D. 1000-1650; Custer 1989:302-307). Figure 41 shows that the possible Minguannan sherds in the assemblage are located in the same area of the site as the Hell Island wares and may indicate reuse of the site by a later group.

FIGURE 41

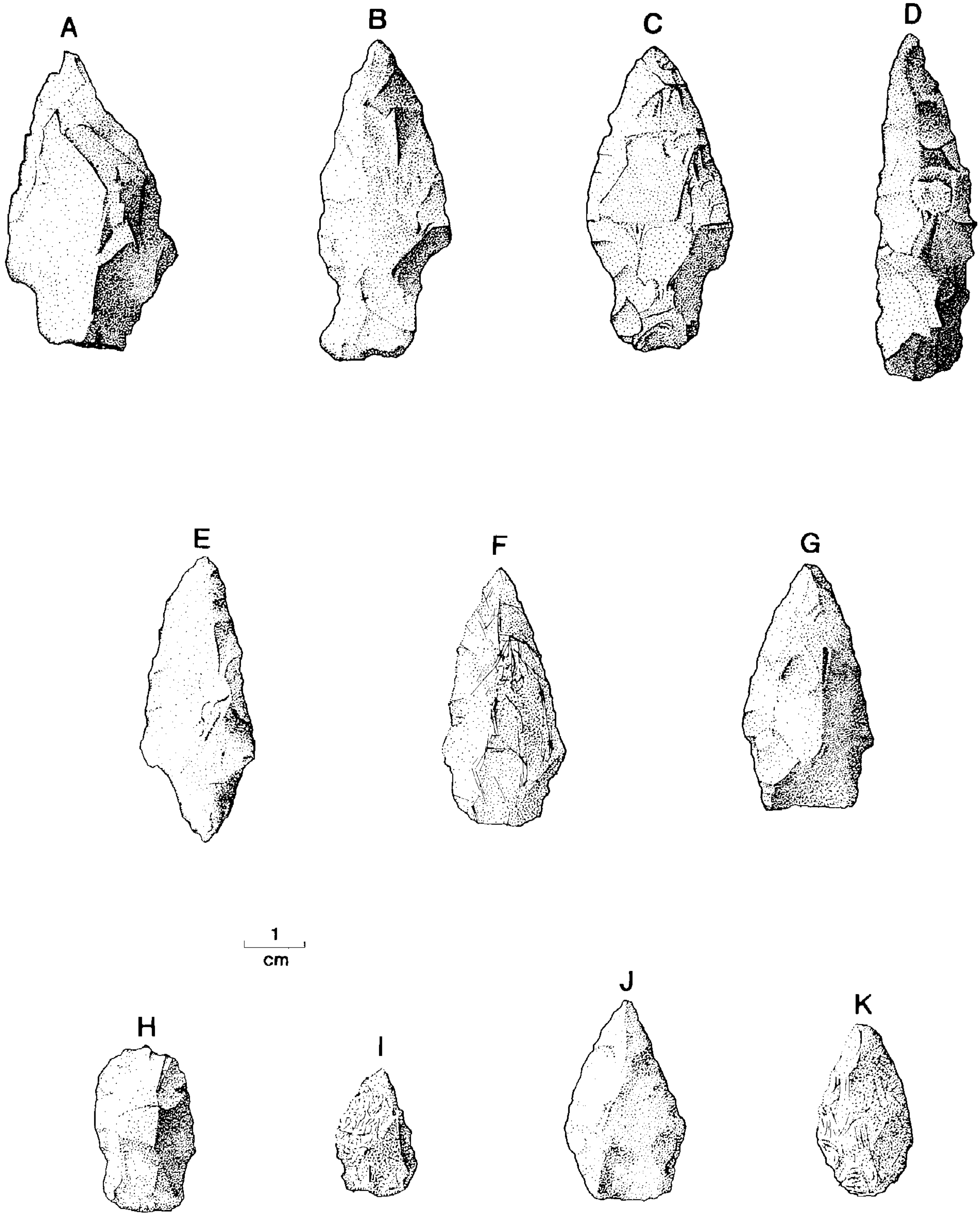
Distribution of Ceramic Ware Types-- Area C



Another sherd (Figure 40B) also resembles Minguannan or Killens ware (Custer 1989:308-09). In addition to quartz/grit temper, it contains evidence of shell temper. Killens ware is more commonly found in central Delaware and is associated with late Woodland sites (Custer 1989:302-305). A final sherd (Figure 40C) with shell and grit temper resembles Mockley or Townsend ceramic wares. Mockley wares date from A.D. 110 to A.D. 450 (Artusy 1976:4; Custer 1989:173-175) and their distribution is more common on the Low Coastal Plain (Custer 1989:302). Townsend wares date to later Woodland times from A.D. 1085 to A.D. 1370 (Griffith 1982:56).

Stemmed points (Figure 42A-H) are the most numerous projectile point types in the Area C assemblage, but the majority are not diagnostic of any particular cultural complex. Stemmed points can only be ascribed in general to the Woodland I Period (ca. 3000 B.C. to A.D. 1000). However, one of the stemmed points from Area C (Figure 42G) appears to be a lanceolate form similar to those found in Area A. Another stemmed point (Figure 42J) appears to be pentagonal in shape, but has extensive resharpening and cannot be definitely identified as pentagonal. As previously discussed, both forms are characteristic of the Fox Creek or Jack's Reef types which date to A.D. 400 - A.D. 900 (Custer 1989:156-160). Jack's Reef forms have often been found in association with Hell Island ceramics (Custer 1989:158). A final point type found in Area C is a teardrop variety (Figure 42K). Teardrop-shaped bifaces have been found in association with radiocarbon dated materials at sites in south central New Jersey (Sites 28-Gl-48 and 28-Gl-5) to dates ranging from 1480 B.C. +/- 250 to 220 B.C. +/- 50 (Mounier and Cresson 1988). It should be noted that the earlier date (1480 B.C.) was based on a sample containing very little carbon and requiring an extended count.

FIGURE 42
Projectile Points--Area C



A - N23.5 W47.5, Level 2, Chalcedony
B - N30.5 W48.5, Level 4, Rhyolite
C - N28.5 W48.5, Level 3, Jasper
D - N25.5 W47.5, Level 3, Chert
E - N28.5 W48.5, Level 4, Jasper
F - N29.5 W42.5, Level 3, Quartz
G - N26.5 W46.5, Level 2, Jasper
H - N27.5 W46.5, Level 2, Jasper
I - N29.5 W50.5, Level 3, Quartz
J - N26.5 W46.5, Level 2, Quartz
K - N25.5 W47.5, Level 3, Quartz

In sum, data from diagnostic artifacts found in Area C indicate that the site experienced multiple occupations throughout the Woodland I Period (ca. 3000 B.C. to A.D. 1000) and possibly into the Woodland II Period (ca. A.D. 1000 to A.D. 1650). The presence of Hell Island ceramic sherds and a lanceolate point suggests that the primary occupation of Area C may have taken place in the Woodland I Period between A.D. 400 and A.D. 1000.

Chipped Stone Tool Technology

The lithic technologies represented at Area C will be analyzed by considering each of the major categories of lithic artifact types found at the site. A discussion of each category is presented below.

Projectile Points. Figure 42 shows the projectile points, not including tip fragments, from Area C. In general, this assemblage consists of stemmed points dating to the Woodland I Period (ca. 3000 B.C. to A.D. 1000). The majority of points (55%) are made from cryptocrystalline cherts, jaspers, and chalcedonies, followed by those made from quartz (36%), and one point made from rhyolite. Rhyolite is not locally available on the Delmarva Peninsula and its nearest primary sources are in central Pennsylvania and western Maryland (Stewart 1984a, 1984b). Its presence in the assemblage in late stage form suggests the possibility that the site's occupants participated in trade and exchange networks. Three points (Figure 42A, C, and J) have remnant cortex, indicating that they were made from secondary cobble resources. One of the points (Figure 42A) was made on a thick flake and has numerous step and hinge fractures from attempts at secondary thinning, and is the only point classified as a manufacturing reject.

The remainder of the points are classified as discards. Two of the points (Figure 42G and K) show impact fractures that would result from their use as spear points in hunting. One of the points (Figure 42K), a teardrop form, was quite small and carefully curated. One point in the assemblage (Figure 42E), a long, narrow, heavily resharpened contracting stem form, was fractured along the edge of its distal tip. The point appears to have experienced an earlier fracture along its lateral edge that was retouched, but the point was too narrow and thin to survive further reworking and was thus discarded. The point form is believed to have functioned in heavy cutting and prying activities (Custer 1989:155-56; Ahler 1971; Custer and Bachman 1986). Another point (Figure 42H) was reworked into a scraper before being discarded. The pattern of careful curation is also suggested by a quartz stemmed form which was resharpened almost to a nub (Figure 42I). A long, narrow contracting point in the assemblage (Figure 42D) is somewhat anomalous and is flawed by a crystal inclusion on its dorsal surface. The point has a thick medial ridge on both its ventral and dorsal surface and is rather severely curved. Nevertheless, edge rounding and micro-chipping along its lateral edges, particularly near the distal end, suggests it may have been used as a knife before being culled from the tool kit. The remainder of the points are so heavily resharpened that their functions are not apparent.

In sum, the projectile points from Area C consist of discarded tools which, although not heavily damaged, are heavily resharpened, reworked, and exhausted. Most are made of cryptocrystalline and microcrystalline materials, nearly one-third of which derived from cobble sources. One point is made of non-local rhyolite and all but one appear to have been simply culled from curated tool kits. A single rejected tool indicates that at least some manufacturing of new tools took place in Area C.

TABLE 19

Cross-tabulation of Biface/Point Types and Raw Materials - Area C

Tool class	Quartzite	Quartz	Jasper	Chert	Chalcedony	Rhyolite	Total
Rejects	1	5	3(1)	1	5(1)	0	15(2)
Discards	0	4(1)	9(2)	2	0	1	16(3)
Total	**1**	**9(1)**	**12(3)**	**3**	**5(1)**	**1**	**31(5)**
Early stage bifaces	0	5	1(1)	0	1	0	7(1)
Late stage bifaces	1	0	7(1)	2	3	0	13(1)
Points	0	4(1)	4(1)	1	1(1)	1	11(3)
Total	**1**	**9(1)**	**12(3)**	**3**	**5(1)**	**1**	**31(5)**

KEY: ( ) = cortex

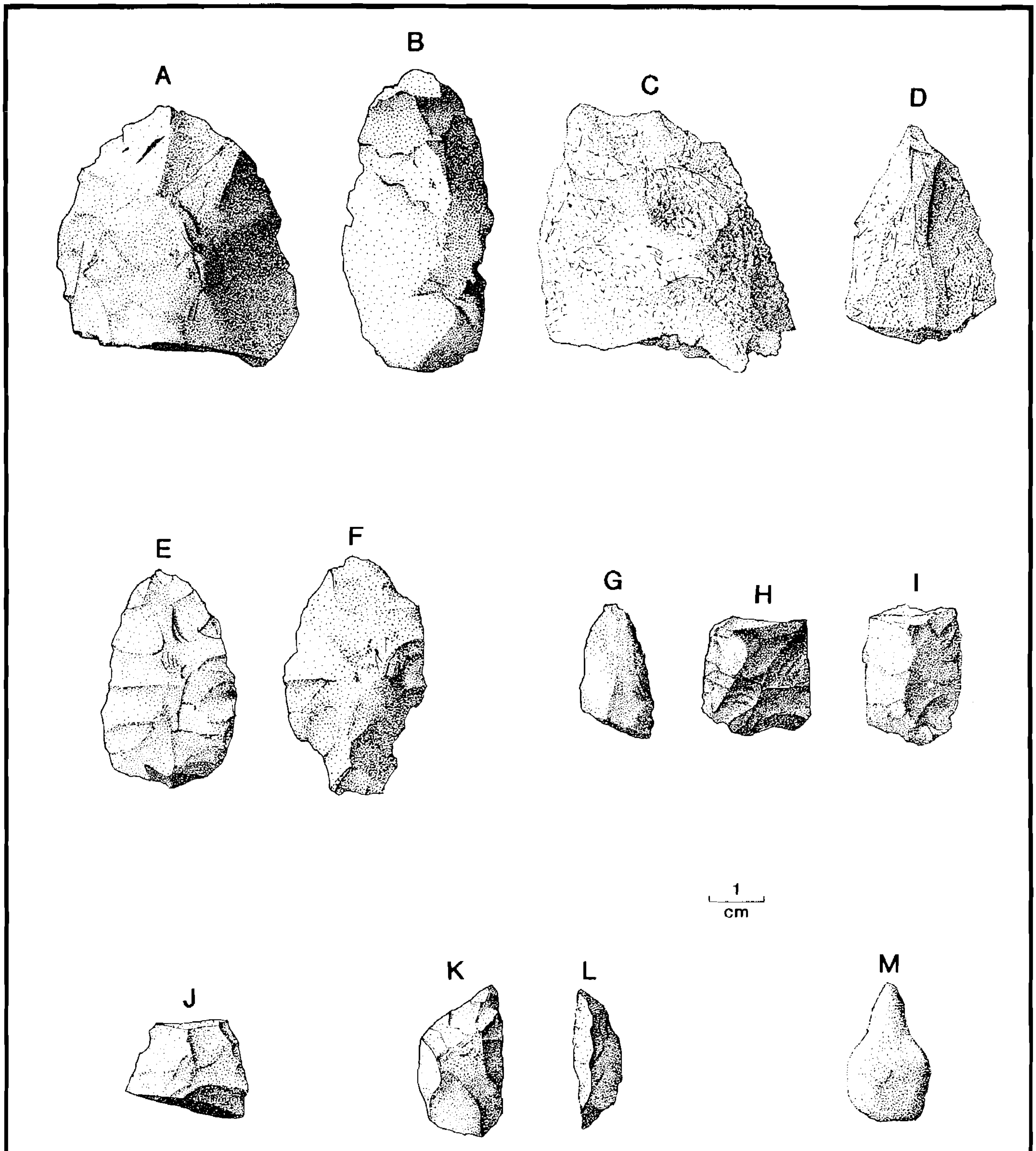
Bifaces. Figure 43 shows a sample of the bifaces recovered from Area C, and Table 19 shows a summary cross-tabulation of the biface and point manufacturing stages (Callahan 1979) and raw materials. The assemblage includes bifaces in various stages of manufacture and consists of both complete forms and fragments.

Twenty-three percent of the bifaces are in the early stages of manufacture. Over 70% of these bifaces are made of quartz and do not contain any signs of cortex. Veins of quartz are present in the rocks of the Piedmont which have been weathered and exposed at the surface throughout time, thus making quartz available for procurement (Custer 1989:56-57). The remaining early stage bifaces from Area C are made on cryptocrystalline materials. One of these bifaces (Figure 43A) was made from a jasper cobble and has remnant cortex. The other (Figure 43B) was made from a piece of heavily encrusted chalcedony. Most of the quartz early stage bifaces, including one thick biface distal section (Figure 43D), were broken fragments of bifacially worked material that had been damaged in the course of secondary thinning (Figure 43C).

Late stage bifaces, not counting projectile points, are overwhelmingly (92%) made from cryptocrystalline cherts, jaspers, and chalcedonies. Only one of these bifaces (Figure 43E) has remnant cortex. Furthermore, only this biface and one other (Figure 43F) are relatively intact. The remainder of the bifaces are fragments. Nearly 40% of the late stage assemblage consists of bifaces with transverse fractures (Figure 43G-I). Ahler (1971) has observed that these fractures occur as a result of twisting and prying motions associated with butchering activities. The poor quality of the material may have contributed to some of the damage. The biface depicted in Figure 43I is encrusted in the area of the fracture. Other late stage bifaces show step and hinge fractures that may have caused damage in the later stages of thinning (Figure 43J). Two of the jasper late stage bifaces (Figure 43K and L) show reddening and crazing that may indicate that these damaged fragments were discarded into a hearth.

The number of rejects and discards (counting projectile points) is relatively even (Table 19). However, there are more than three times as many late stage as early stage bifaces in the Area C assemblage. The majority of early stage bifaces are made of quartz.

FIGURE 43
Sample of Bifaces--Area C



A - N31.5 W47.5, Level 2, Jasper
B - N26.5 W48.5, Level 1, Chalcedony
C - N26.5 W48.5, Level 3, Quartz
D - N30.5 W48.5, Level 1, Quartz
E - N26.5 W48.5, Level 2, Jasper
F - N26.5 W48.5, Level 3, Jasper
G - N26.5 W46.5, Level 2, Jasper
H - N30.5 W48.5, Level 1, Chert
I - N26.5 W48.5, Level 1, Chalcedony
J - N29.5 W32.5, Level 1, Chert
K - N33.5 W47.5, Level 2, Jasper
L - N35.5 W47.5, Level 2, Jasper
M - N30.5 W48.5, Level 2, Argillite

In sum, the biface assemblage from Area C consists of more late stage than early stage bifaces and a fairly even amount of discards and rejects. Cryptocrystalline materials dominate the assemblage (65%) followed by quartz (29%); one non-local rhyolite biface is also present. The majority of cryptocrystalline bifaces are damaged and exhausted late stage discards that appear to have been culled from curated tool kits. Discarded bifaces mainly exhibited damage from twisting and prying motions associated with butchering activities. A small amount of tool manufacturing, primarily from quartz, is also indicated.

One final bifacial tool (Figure 43M) in the assemblage is a drill made from argillite. Argillite is a non-local material; the closest primary outcrops are found in the Pennsylvania Piedmont and in central western New Jersey (Custer 1989:245-247). Because argillite is susceptible to the effects of the weathering process, the material breaks down rather rapidly and is therefore seldom found in cobble form. It is likely that the drill was also part of the curated tool kit carried into the site and was then culled from the kit and discarded at the site.

Cores. No true cores were found in Area C. One flaked quartzite cobble fragment and one flaked ironstone cobble were recovered. The cores indicate that cobble sources were being investigated as potential sources of raw material and were used, to some degree, to produce flakes for the manufacture of tools.

Groundstone Tools. One palm-sized quartzite cobble, recovered from Area C, had light pecking on a protruding knob, indicating that it may have been used as a hammerstone for percussion flaking of stone tools.

Debitage. Table 20 shows the distribution of various types of raw materials and the presence of cortex on the debitage from Area C. In general, the debitage from Area C exhibits a low incidence of cortex. However, there is a notable presence of cortex on both chert (20%) and quartzite (22%) flakes which indicates that at least some cobbles were being reduced in Area C. The preferred material in Area C was quartz (38% of total debitage; Table 20); however, when the cryptocrystalline materials are combined, they represent 53% of the total debitage.

TABLE 20

Debitage Cortex and Raw Materials - Area C

Cortex presence/ absence	Jasper	Chert	Chalcedony	Quartz	Quartzite	Rhyolite
Absent	271	193	23	367	66	8
(% of raw material)	(90)	(80)	(96)	(92)	(78)	(89)
Present	30	47	1	32	19	1
(% of raw material)	(10)	(20)	(4)	(8)	(22)	(11)
Total	301	240	24	399	85	9
(% of total raw material)	(28)	(23)	(2)	(38)	(8)	(1)

TABLE 21

Debitage Attribute Frequencies - Area C

Flake type		**Size**		**Platform shape**		**Platform preparation**	
Complete	43	< 2 cm	75	Triangular	10	Present	22
Proximal	24	2-5 cm	25	Flat	11	Absent	45
Medial	9	> 5 cm	0	Round	46	No observation	33
Distal	24			No observation	33		
		Scar count				**Directions count**	
Cortex		Mean	= 1.53	**Remnant Biface Edge**		Mean	= 1.31
Present	34	Standard deviation	= 1.49	Present	1	Standard deviation	= 1.18
Absent	66			Absent	99		

Sample of 100 flakes

In order to get a better picture of lithic resource use at the site, an attribute analysis (Appendix II) based on the work of Verrey (1986), Magne (1981), and Gunn and Mahula (1977) was conducted on a sample of 100 randomly selected flakes from Area C. The test was conducted in an attempt to determine whether the flakes in Area C resulted from the reduction of bifaces or from cores. The results of the analyses (Table 21) suggest that biface reduction may have been more commonly practiced at the site than core reduction, although the use of cobble cores is also indicated.

For example, the higher incidence of broken flakes suggests that bifaces were being reduced in Area C (Lowery and Custer 1990:97). Another indicator of biface reduction is the presence (22%) of platform preparation on the flakes (Callahan 1979). However, there is a very low incidence of remnant biface edges on the sample flakes. The strongest indicator of core reduction (from cobbles) is the relatively high incidence of cortex on the sample flakes (34%). The percentage of cortex in the attribute sample is considerably higher than that for the debitage assemblage as a whole (12%). The attribute sample may be biased because it was taken from the central core area of Area C where debitage was concentrated.

Analyses of two attributes proved inconclusive. Gunn and Mahula (1977) have noted an association of triangular platforms with biface thinning flakes, flat platforms with flakes struck from cores, and round platforms with the early stages of biface reduction and decortication. The Area C sample contains a fairly even number of flakes with triangular and flat platforms, while the presence of early stage bifaces in the artifact assemblage and cortex-bearing flakes in the attribute sample indicate that the round platforms in the sample could have resulted from either early stage biface reduction or decortication of cobbles. The number of flake scars present on the dorsal surfaces of the sample flakes as well as the number of directions in which the scars were oriented was also considered. The mean values were determined and compared to those produced by Errett Callahan for his analysis of debitage from the reduction of early and late stage bifaces and cores (Appendix II: Table 34). The number of scars is most similar to Callahan's core values. However, the complexity of scar directions is most similar to Callahan's early stage biface.

The final attribute considered was flake size. The majority of flakes in the sample were quite small indicating that flakes in the Area C sample did not primarily result from the reduction of large cores or large early stage bifaces. This result is consistent with the late stage of manufacture that is indicated by the tools recovered from Area C.

TABLE 22

Summary of Blood Residue Analysis - Area C

Sample Type	Number of Samples	Number of Tests Conducted	Number of Samples Showing + Reaction	Number of Samples Showing - Reaction
Control (soils, pebbles, gravels)	21	63	0	21
Tools	13	41	2	11

In sum, debitage from Area C had a notable presence of cortex, indicating that cobble resources were at least used to supplement primary sources of raw material. Material preferences were quite varied, but mainly consisted of cryptocrystalline varieties followed by microcrystalline quartz. Furthermore, results of flake attribute analysis suggest that biface reduction was probably more widely practiced in Area C than was core reduction, but evidence of cobble resource utilization is also indicated.

Blood Residue Analysis

Lithic artifacts from Area C were subjected to blood residue analysis using protocols developed by the University of Delaware Center for Archaeological Research (Custer, Ilgenfritz, and Doms 1988). The analysis is used to determine the presence of hemoglobin on the tools, indicating possible use of the tools in game procurement and processing activities.

Soil, pebble, and gravel samples were taken from each subsoil level of a 50 cm block from each 2 m sq. test unit in the core area. These control samples were tested to determine the presence of organic or chemical contamination. All of the 63 tests on 21 control samples produced negative results, indicating that the soils in Area C were free of contamination (Table 22). Twelve bifaces and one ground stone tool were then tested. The test was applied to several loci on each tool for a total of 41 individual tests on 13 tools. Eleven tools tested negative for the presence of blood residue. Two of the bifaces (Figure 42B and 42J) showed slight positive reactions from one tested area on each biface.

TABLE 23

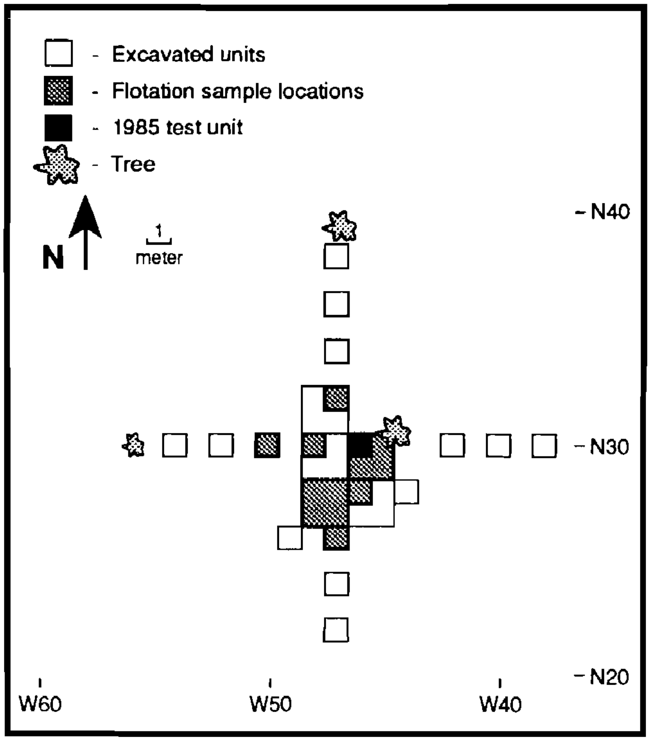
Summary Catalog of Artifacts and Ecofacts Recovered in Flotation Sample - Area C

Lithic Debitage		**Charred Remains**	
Quartz	90(2)	Spores	1412+
Jasper	47	Unidentified Charred Nut Fragments	2
Chert	31(2)	Unidentified Charred Seed	1
Chalcedony	1		
Quartzite	6		

KEY: ( ) = Cortex

FIGURE 44

Test Units from which Flotation Samples were Taken--Area C



In sum, the results indicate only that blood residues are not now present on 11 of these artifacts and that two bifaces may show some trace of blood residue. No further interpretations are possible.

Floated Artifacts and Ecofacts

Flotation samples were taken from seven excavation units in the core area (Figure 44). One 50 cm sq. block from each of the units was selected, and all soil from that block was bagged by 5 cm level and returned to the lab for processing. Therefore, each individual sample represents 12,500 cubic centimeters of soil. All samples were then processed using a water driven flotation tank to separate heavy and light fractions. Heavy fractions were collected in window mesh size screen, and light fractions were collected in a silk bag. After drying, all artifacts and ecofacts were removed and cataloged.

Artifacts recovered in the heavy fraction consist of lithic debitage, and charred organic remains recovered from the light fraction consist largely of spores (Table 23). In two samples spores were present in such large quantities that only a portion was analyzed. Only one unidentifiable charred seed and two unidentifiable charred nut hull fragments were present in addition to the numerous spores. No carbon was recovered in the flotation samples.

Table 24 shows a comparison of raw material frequency between debitage recovered from 1/4-in. screens and that recovered in flotation. Results of the comparison indicate that the two samples are fairly consistent with one another in that quartz dominates both assemblages, followed by jasper, chert, quartzite, and chalcedony in descending order. The table also shows that, in general, higher percentages of flakes are recovered in 1/4-in. screen than in flotation. However, the comparisons from Area C show

TABLE 24

Raw Material Frequency: Flotation vs. 1/4-inch Screen - Area C

	Flotation			Screen	
Jasper	47	26.90%	Jasper	301(30)	28.40%
Chert	31(2)	17.70%	Chert	240(47)	22.70%
Chalcedony	1	0.60%	Chalcedony	24(1)	2.30%
Quartz	90(2)	51.40%	Quartz	399(32)	37.70%
Quartzite	6	3.40%	Quartzite	85(19)	8.00%
Rhyolite	0	0.00%	Rhyolite	9(1)	0.90%

KEY: ( ) = Cortex

PLATE 15

Sample of Ceramic Sherds--Area C

one anomaly to this pattern where there is a much higher incidence of quartz in the flotation assemblage than in the screen assemblage. One explanation for the higher frequency of quartz in the flotation sample is that quartz is more prone to fracturing when struck and thus produces more micro debitage to be collected in flotation. The majority of early stage bifaces in the Area C artifact assemblage are made of quartz, and their manufacture would likely produce an abundance of micro debitage. The presence of jasper and chert in the flotation assemblage is most likely due to micro debitage created by tool edge maintenance activities.

In sum, the charred organic remains from Area C mainly consist of spores and do not suggest processing of food resources. Lithic debitage recovered in flotation is largely consistent with that recovered in 1/4-in. screen, except for quartz which occurs in much greater frequency in the flotation assemblage. The results indicate that quartz was being used in the manufacture of tools, while cryptocrystalline tools were undergoing edge maintenance activities.

Ceramic and Textile Technologies

Seventy-six percent of the identifiable ceramic sherds recovered from Area C are classified as Hell Island based on a temper consisting of quartz, mica, and grit (Griffith 1982). An additional 19% of the sherds are not able to be classified definitively, but resemble ceramic types dating to the middle to late Woodland Period (ca. A.D. 100-1600). An additional 16 sherds are not identifiable as to type because they are spalled or too small for analysis of attributes. In general, the temper in these sherds is quartz and grit with occasional shell and/or clay particles. All of the sherds recovered in Area C are small in size; the largest sherd measures 5.3 cm at its maximum dimension, and sherds range from 0.4-0.9 cm in thickness.

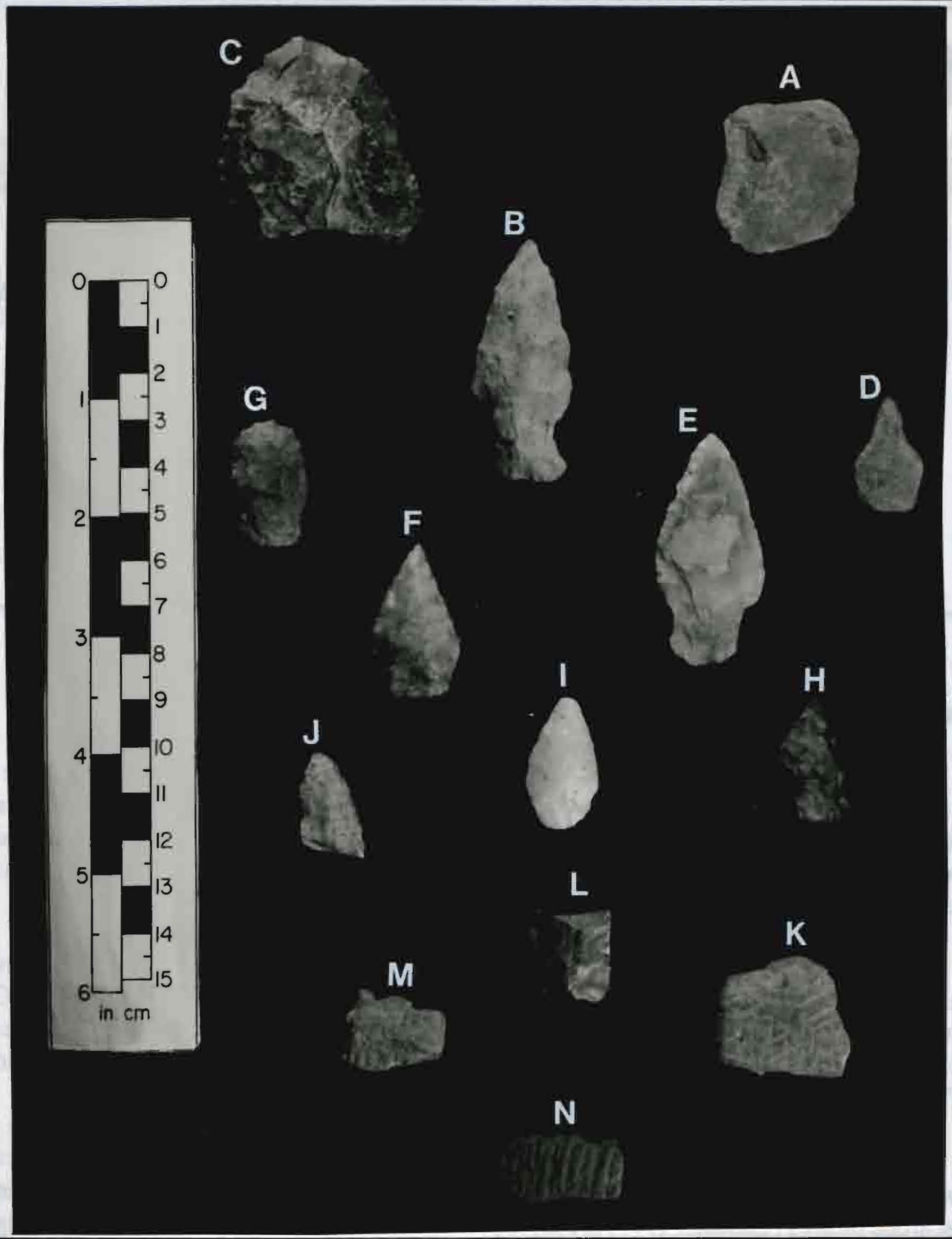
Analysis of the surface treatments observed on the sherds from Area C provides some insight into ceramic and textile practices at the site. A variety of surface treatments is indicated, including corded (24%) (Figure 40D) and fabric impressed (8%) (Figure 40E). In addition, one Hell Island sherd has a fabric impressed exterior surface and a corded interior surface. Surfaces on most of the remaining sherds are very worn and/or without decoration.

As was noted in the discussion on Area A ceramic sherds, clay impressions enable further analysis of the cordage and textile treatments. Plate 15 shows a sample of ceramic sherds from Area C paired with their clay impressions. The clay impressions show that cord-wrapped sticks and paddles were used to create the designs on the largest number of sherds. The worn condition of the sherd surfaces makes it difficult to determine cordage directions in every case, but at least two sherds in the assemblage show that the designs were applied in multiple directions (Plate 15C and D).

Patterns of cordage twist directions (S-twist and Z-twist) are also able to be determined (Figure 22). This information can be used to identify ethnic groups that were engaged in regional social interaction. Virtually all of the discernible cordage twists in the Area C assemblage are S-twists, including those on five of the Hell Island sherds. None of the possible late Woodland sherds have discernible cordage designs. Thus, it can be said that the ceramic assemblage in Area C is dominated by S-twist cordages as recorded from ceramic design impressions.

PLATE 16

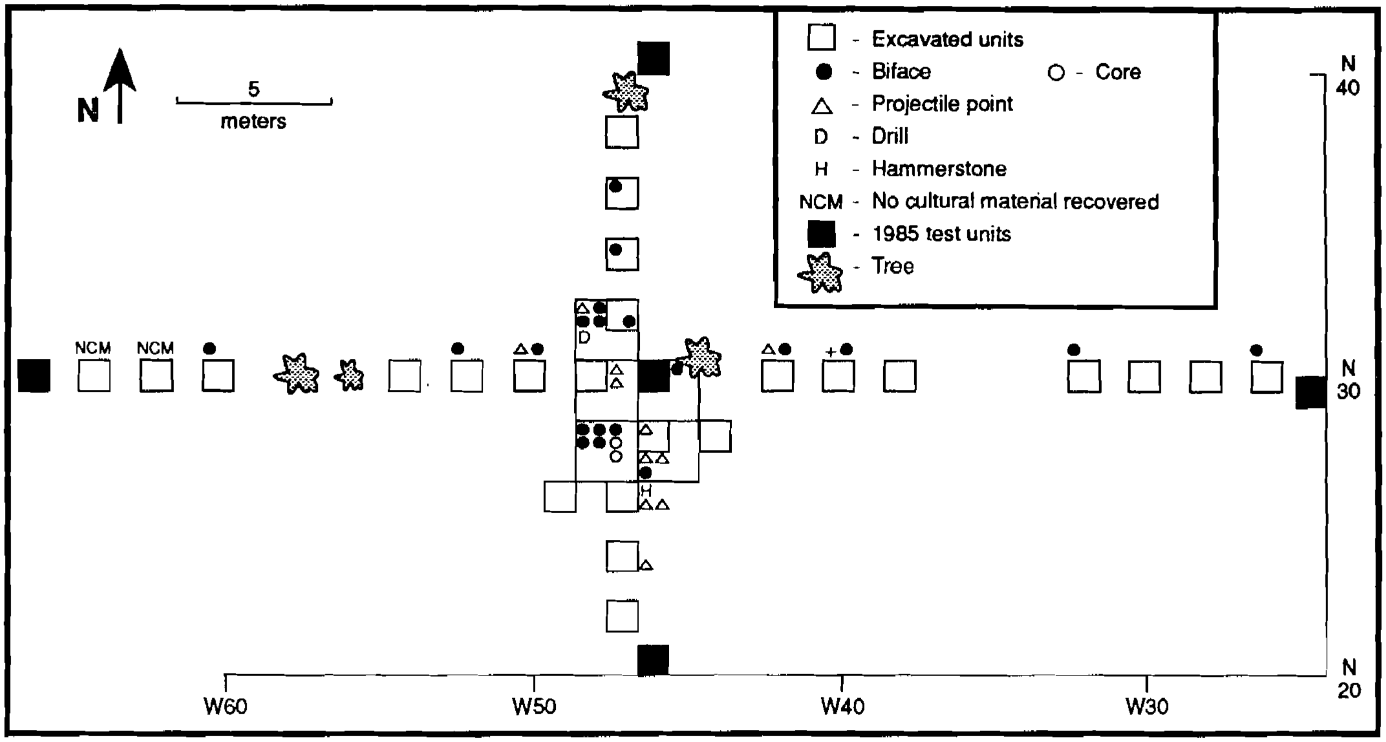
Sample of Artifacts Recovered from Area C



A - Quartzite cobble core
B - Rhyolite point
C - Jasper early stage biface reject
D - Argillite drill
E - Jasper stemmed point
F - Quartz pentagonal point
G - Jasper stemmed point reworked into scraper
H - Jasper point fragment
I - Quartz teardrop point
J - Jasper biface distal fragment
K - Hell Island fabric-impressed ceramic sherd
L - Chert point fragment
M - ? Minguannan rim sherd
N - Hell Island corded ceramic sherd

FIGURE 45

Distribution of Tools--Area C



Activity Areas

In order to delineate any horizontal clustering, the spatial distributions of various artifact classes (tools, debitage, ceramic sherds, and fire-cracked rocks) were mapped using each 1 m test unit and test unit expanded to 2 m in the core area as minimum provenience units within undisturbed soils. As previously discussed, the vertical position of artifacts is thought to be disturbed; therefore, artifacts from all levels have been combined for the analysis of activity areas.

Figures 45-48 show the location of all tools, debitage, ceramic sherds, and fire-cracked rocks recovered from Area C, and Plate 16 shows a sample of the artifacts recovered from Area C. Tool concentrations are densest in the central core area of the site and consist primarily of projectile points/ knives and bifaces (Figure 45). Two flaked cobbles, a drill, and a hammerstone were also found in this part of the site.

Figure 49 shows the location of early and late stage bifaces, and Figure 50 shows the location of bifaces rejected in the course of manufacture as well as those that were used and discarded. Late stage and discarded bifaces (Callahan 1979) are more prominent in the central core of Area C, although early stage and rejected bifaces are also present. This configuration suggests that broken and exhausted tools were being discarded in Area C, while a low level of manufacture to replace these tools was also taking place. The presence of a hammerstone and two cobble cores in the area also support the inference of tool manufacturing.

FIGURE 46

Distribution of Total Debitage--Area C

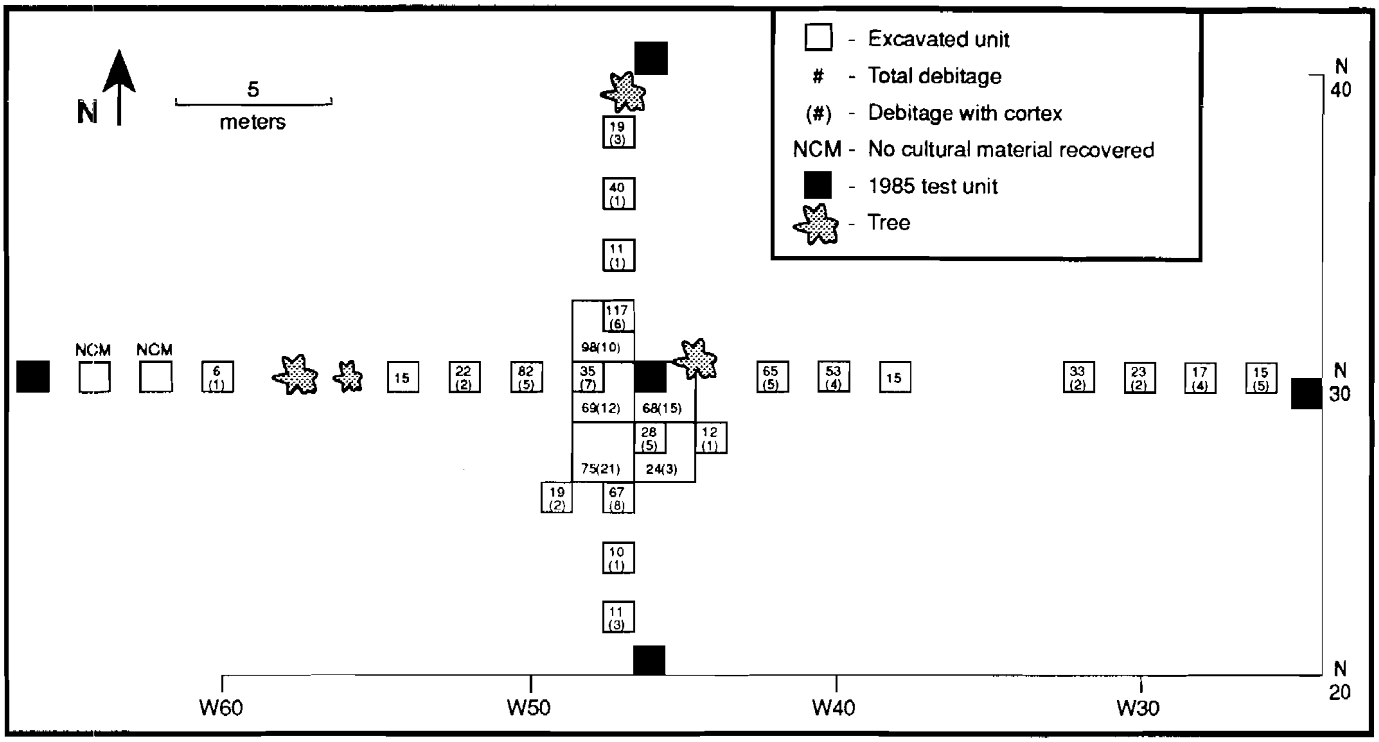


FIGURE 47

Distribution of Ceramic Sherds--Area C

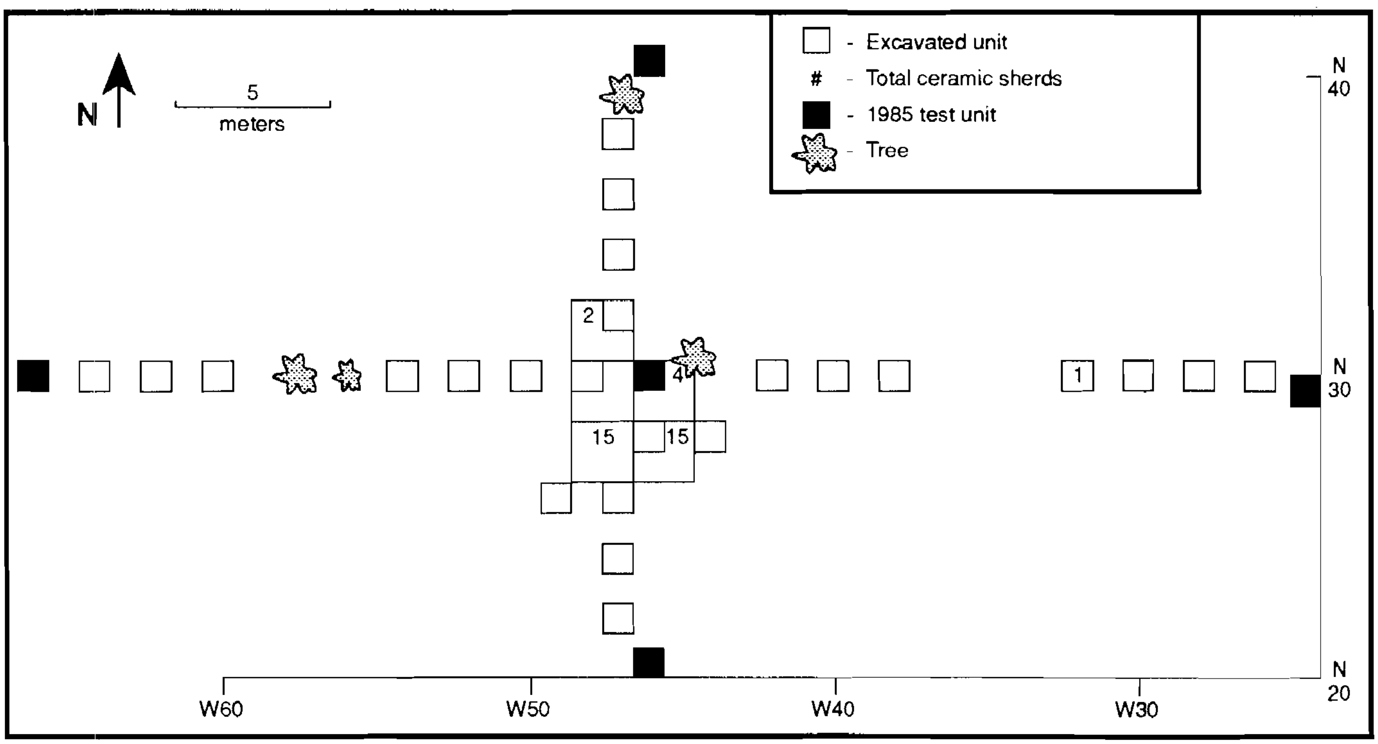
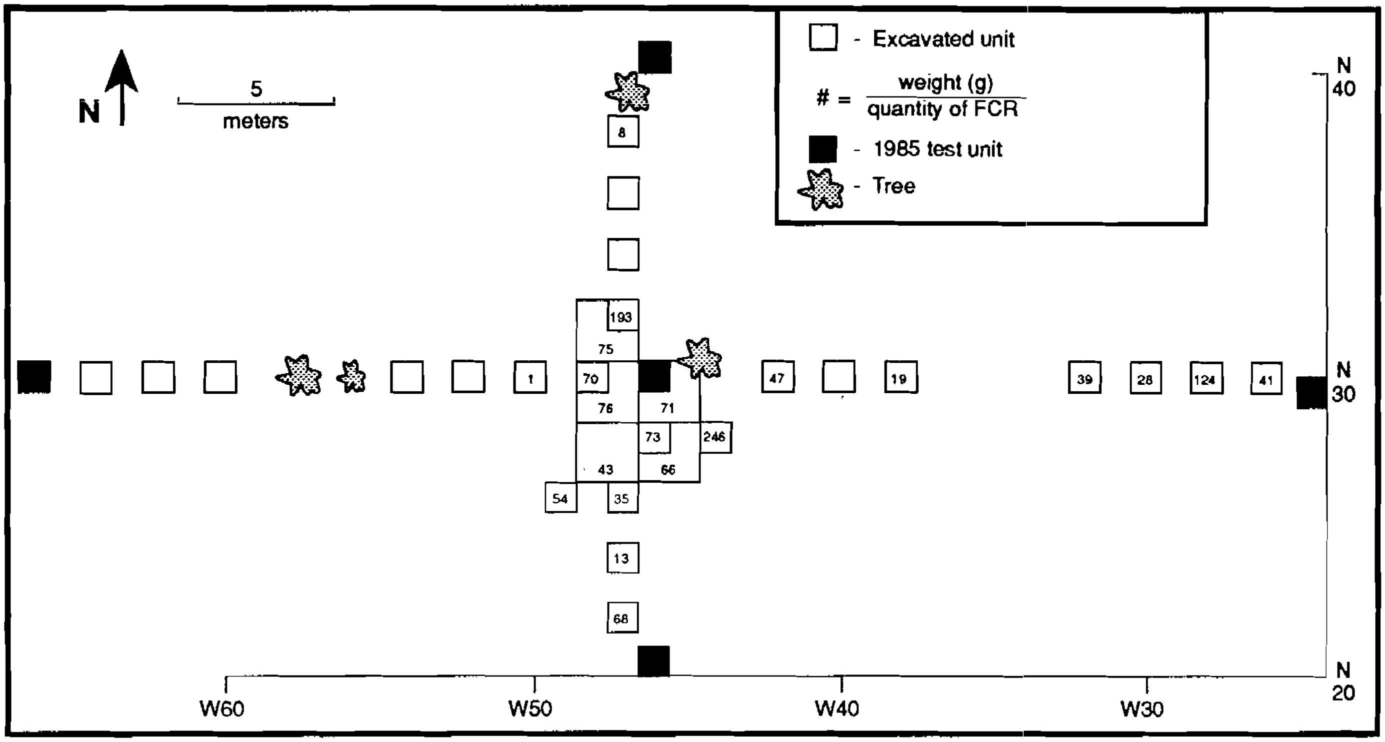


FIGURE 48

Distribution of Fire-Cracked Rocks--Area C



In addition, two of the projectile points in Area C's core tested slightly positive for presence of blood residue (Figure 42B and 42J). One of these points was found in Test Unit N26.5W46.5. Also present in that unit was an impact fractured projectile point (Figure 42G) and a discarded late stage biface distal section (Figure 43G). A projectile point reworked into a scraper was found in Test Unit N27.5W46.5 (Figure 42H). These tools may indicate that some butchering/processing of hunted game also took place in the core of Area C.

Figure 46 shows the distribution of debitage in Area C. Flakes are distributed across most of the site but are concentrated in the central core. Figures 51 - 54 show the distribution of flakes of various raw materials. Quartz makes up the majority of flakes in Area C and generally conforms to the distribution for total flakes. Jasper is also well represented in the flake assemblage from Area C and its distribution also conforms to the distribution for total flakes. Chert and quartzite flakes are present in much lower quantities than quartz and jasper but their distributions also conform to that for total debitage. Chalcedony and rhyolite were not mapped because their low numbers would not provide additional meaningful information. Figure 46 also shows that the incidence of cortex on the debitage from Area C is relatively low and dispersed throughout the site, with the highest concentrations occurring in the central core. This information, along with the presence of two cortex bearing cobble cores in the center of Area C, suggests that some degree of cobble reduction was taking place in this area of the site.

Ceramic sherds are largely concentrated in the core area, particularly in Test Units N26.5W48.5 and N26.5W46.5 (Figure 47). The majority of identifiable sherds are Hell Island type and a few appear to be late Woodland Minguannan, Minguannan/Killens, and Mockley/Townsend wares. However, temper among the sherds, even within the identifiable Hell Island category, is inconsistent, with

FIGURE 49

Distribution of Early Stage and Late Stage Bifaces--Area C

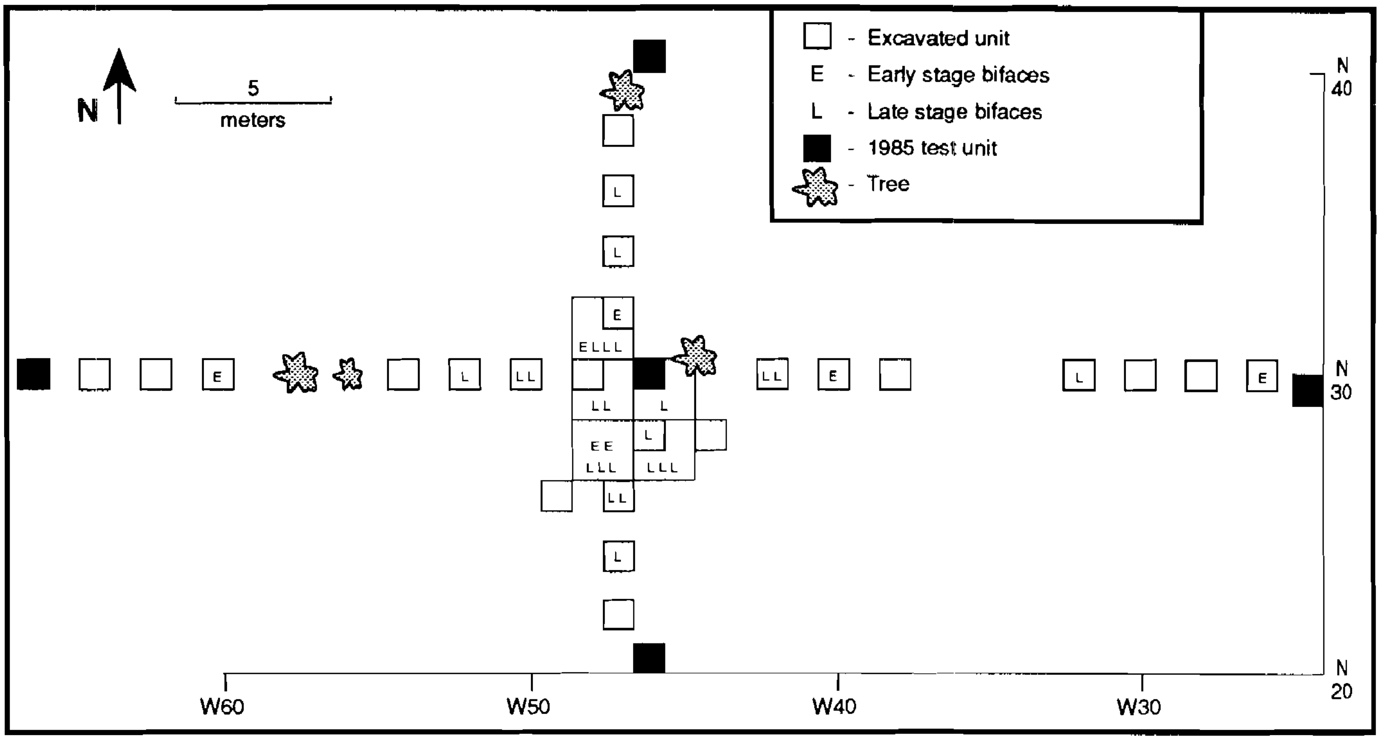


FIGURE 50

Distribution of Rejected and Discarded Bifaces--Area C

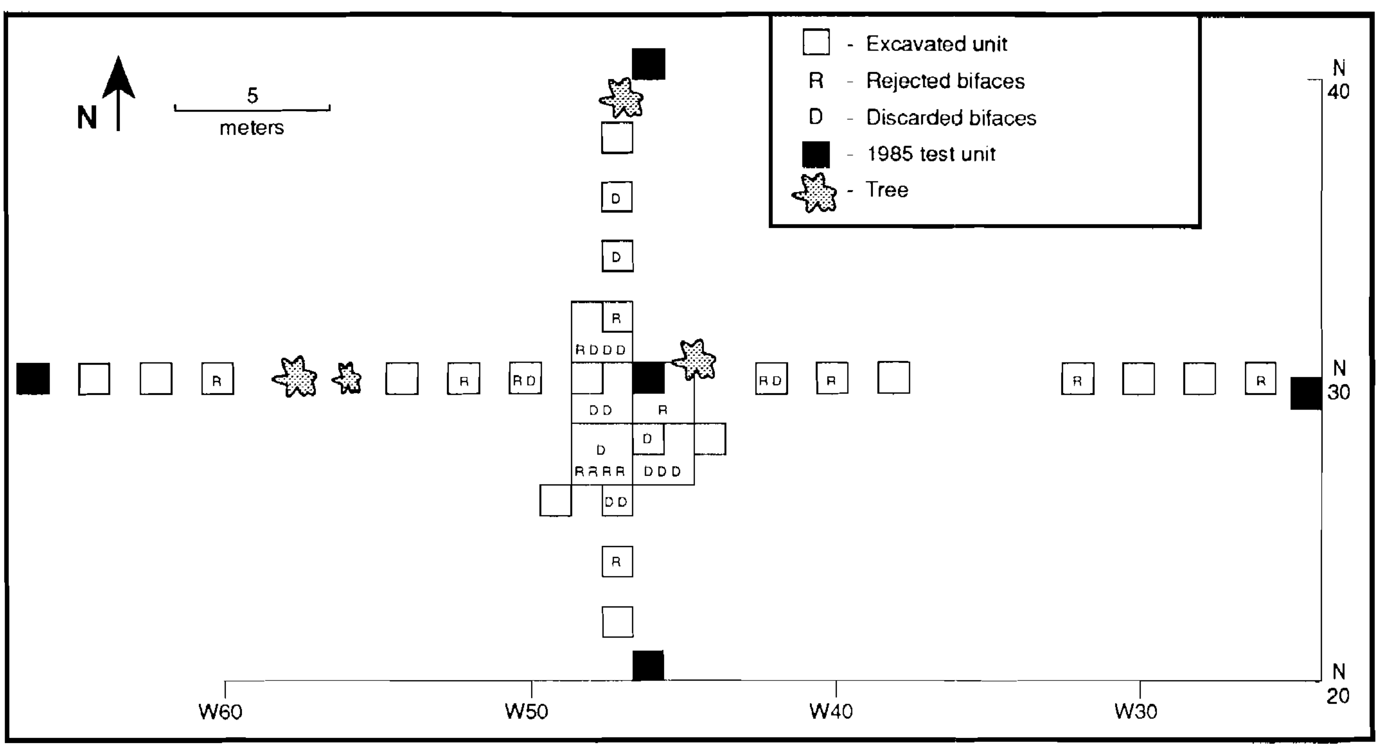
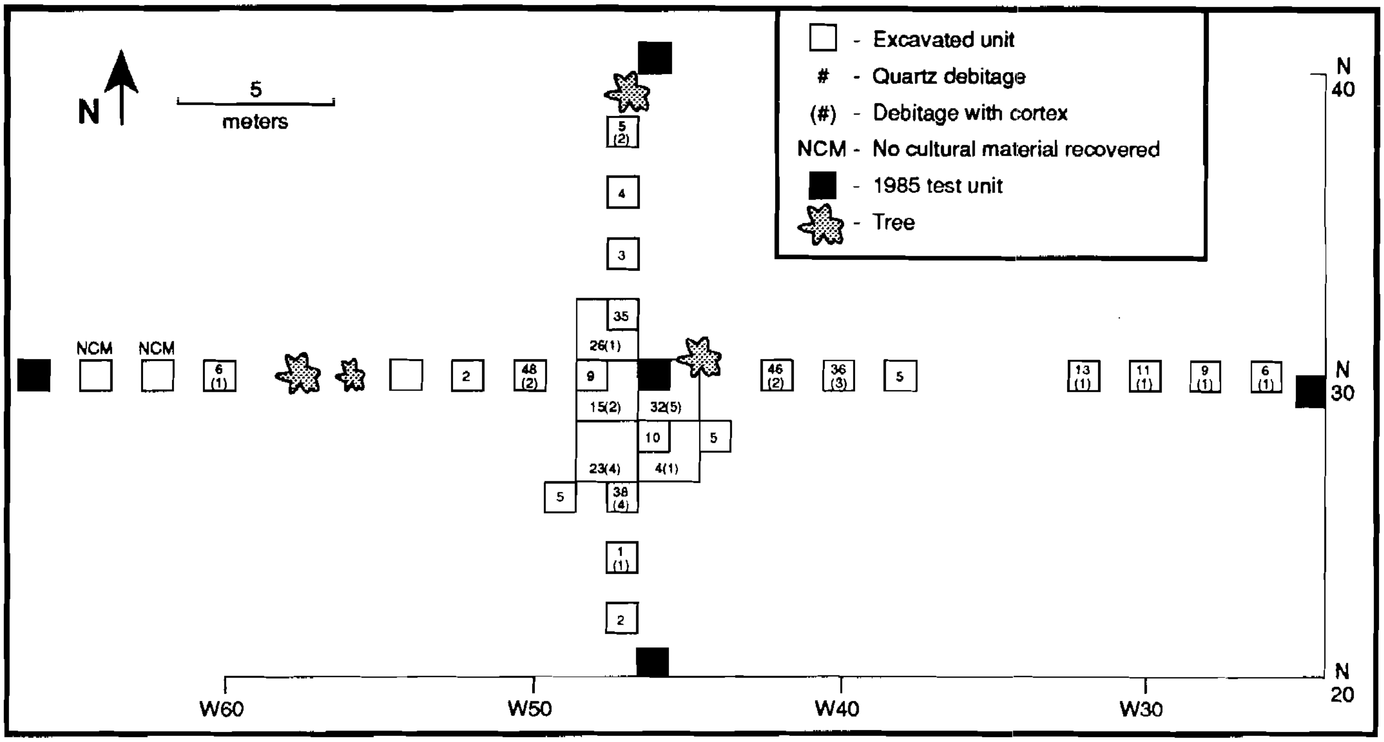


FIGURE 51

Distribution of Quartz Debitage--Area C



occasional occurrences of shell, clay, and grit appearing along with the more typical agents of quartz and mica. Surface treatments consist of corded and fabric-impressed designs, and all discernible cordage twists are S-twists. The fact that the majority of sherds are fairly tightly concentrated, that the total number is relatively low, and that all the observable twists are S-twists suggests that the sherds come from a single vessel or perhaps two vessels. However, the variety of tempering agents suggests that the sherds come from several different vessels.

The sherds were found in the core area of the site in units that were surrounded by several small concentrations of fire-cracked rocks (Figures 47 and 48). It is possible that the presence of ceramic sherds in this area suggests that food preparation was taking place; however, only one sherd is burned and no other signs of charring or sooting appears on any of the other sherds. Furthermore, no food processing tools or charred edible seeds were found in this part of the site. Therefore, the function of the vessel or vessels and the activities associated with them cannot be ascertained.

Several small concentrations of fire-cracked rocks are present throughout the central core and east of the core along the N29.5 line (Figure 48). These concentrations may represent hearth areas but they cannot be clearly associated with particular, separate activities.

In sum, no clearly defined separate activity areas can be delineated within Area C. The majority of tools, debitage, ceramic sherds, and fire-cracked rocks are concentrated in the central core of Area C. In general, the assemblage is dominated by damaged and worn late stage bifaces and projectile points culled from curated tool kits. The presence of early stage and rejected bifaces, as well as cobble cores, suggest that a low level of manufacture to replace the discarded tools was also taking place.

FIGURE 52

Distribution of Jasper Debitage--Area C

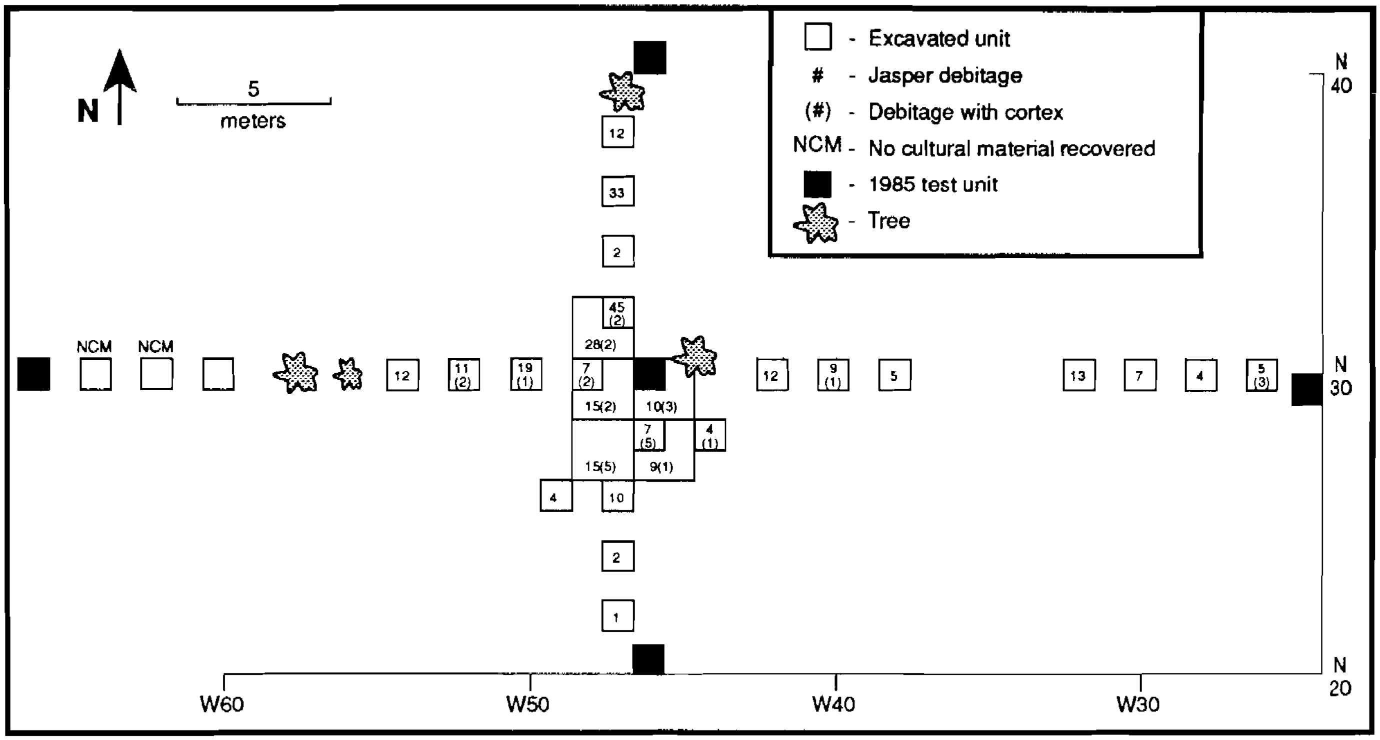


FIGURE 53

Distribution of Quartzite Debitage--Area C

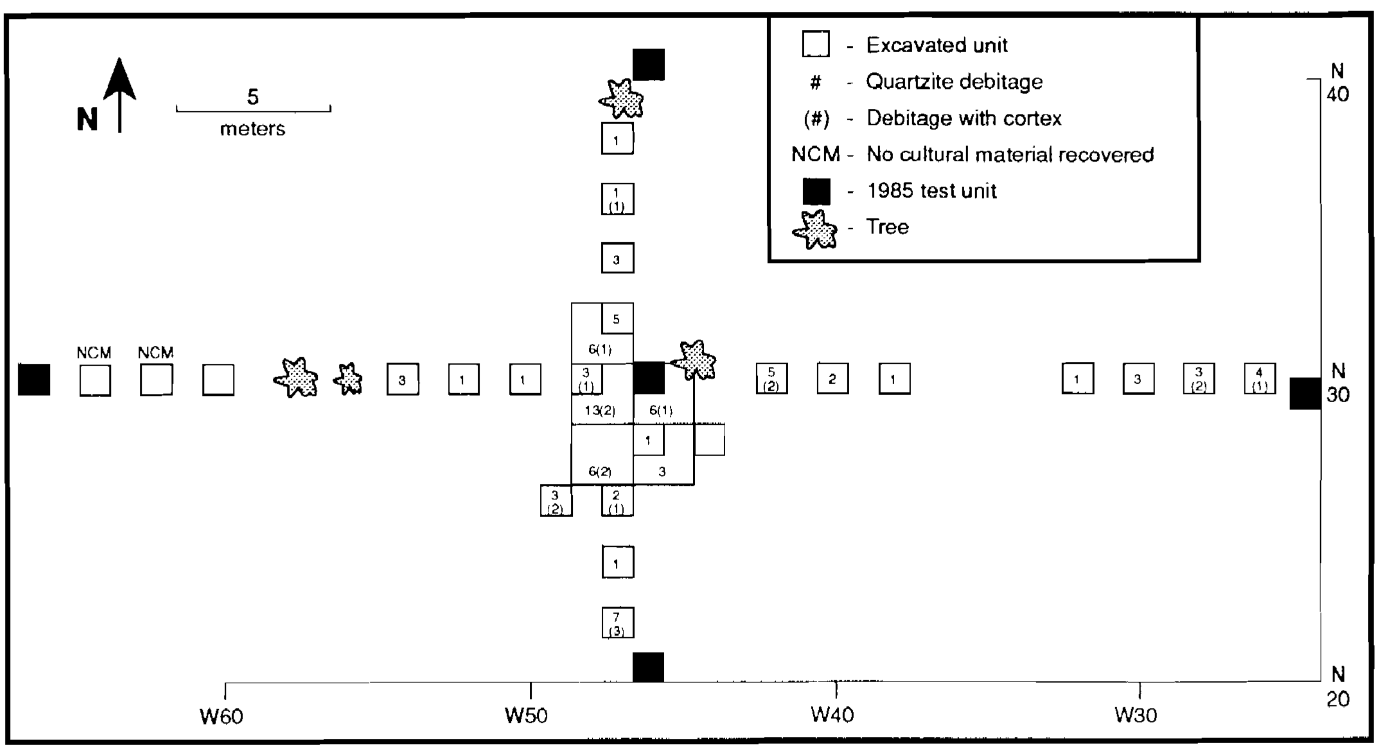
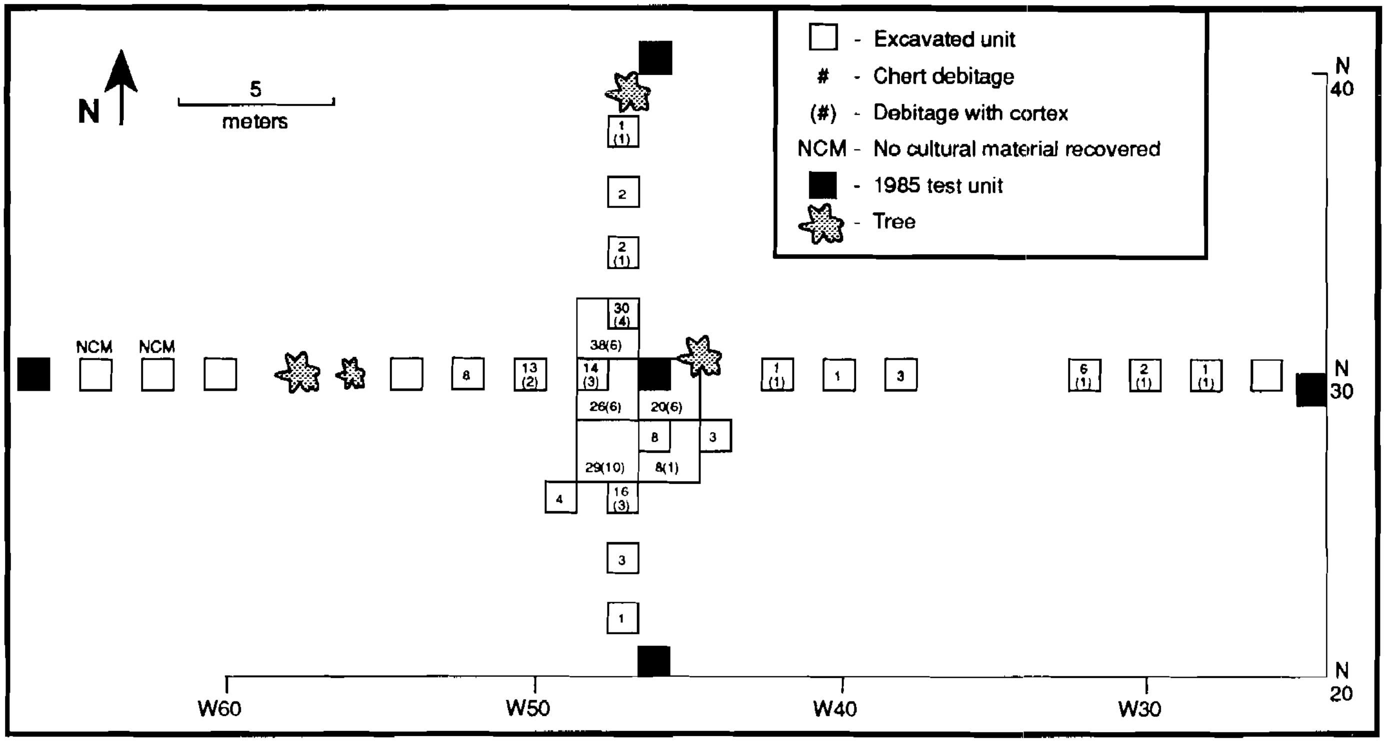


FIGURE 54

Distribution of Chert Debitage--Area C



Tools that tested slightly positive for blood residue were also found in Area C and may indicate butchering activities. Quartz dominated the raw material assemblage in Area C followed by jasper, but the generally low incidence of debitage suggests that the reduction of bifaces and cores was not an important activity. A moderate presence of cortex was observed on debitage in the central core of Area C suggesting that locally available secondary raw materials were used to supplement primary sources.

In conclusion, the archaeological data suggests that Area C was occupied during the Woodland I Period (ca. 3000 B.C. - A.D. 1000), particularly after A.D. 0 and perhaps during the Woodland II Period (ca. A.D. 1000-1650). Activities taking place in Area C consisted of culling damaged tools from curated tool kits, small-scale manufacture of replacement tools, and perhaps butchering activities.